

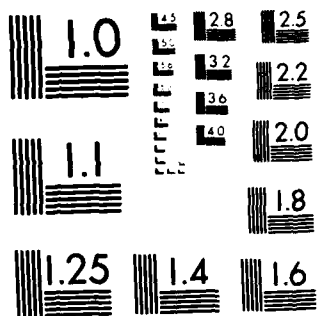
APC-4 INFRARED PLUME GENERATOR QUALIFICATION
OPERATIONAL TEST AND EVALUATION (QOT&E)(U) TACTICAL AIR
COMMAND LANGLEY AFB VA 02 MAY 83

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DEPARTMENT OF THE AIR FORCE

HEADQUARTERS TACTICAL AIR COMMAND
LANGLEY AIR FORCE BASE VA 23065

2 May 1983

TAC PROJECT ORDER: APC-4 Infrared Plume Generator Qualification
Operational Test and Evaluation (QOT&E)

PROJECT ORDER NUMBER: 83B-072A

TO: USAFADWC/CC

1. INTRODUCTION.

a. Background.

(1) In CY 74, an Armament Division requirement arose to develop infrared plume augmentation devices for USAF subscale aerial targets while improving target survivability in an infrared (IR) guided missile firing environment. Based upon results from hundreds of IR missile firings against the existing Hayes International Corporation's AZC-1 11-inch continuous infrared (CIR) wingtip pods used on BQM-34A subscale aerial targets, a wingtip pod concept was determined to have the highest probability of success. As a result, a 12-inch diameter pod, the APC-3, was prototyped by Hayes and subjected to extensive contractor and joint USAF/contractor tests. These tests demonstrated substantial plume output over a practical airspeed/altitude envelope consistent with the aerodynamic capabilities of USAF subscale aerial targets.

(2) Because of its bulk and complexity in design, the APC-3 was refined by Hayes, resulting in development of the seven-inch diameter APC-4. The APC-4 was flown on a J85-7 configured BQM-34A at White Sands Missile Range in October/November 1979 and IR measurements were made by a USAF F-4/SAIMS radiometric aircraft. The measurements indicated that the APC-3 performance had not been significantly altered and the output of the APC-4 far exceeded the minimum augmentor requirements defined by Technical Memoranda 1427-8 and 1427-11 prepared by Analytics, Fort Walton Beach, Florida.

(3) In follow-on contract F08635-81-C-0082, the APC-4 was further scaled down to four- and five-inch diameter systems set at various target fuel flow parameters. These pods were functionally tested on a T-33 at Mojave, CA 5-7 Aug 81, followed by an infrared evaluation using the F-4/Beam Aspect Seeker Evaluation System (BASES) at Eglin AFB, FL. The test results were documented and analyzed by Analytics, Inc., in Technical Memorandum 1740-1, dated 4 Apr 82, and briefed on 3 May 82 to USAFTAWC WSEP personnel, who subsequently recommended it be further investigated in the WSEP environment.

b. General.

(1) Upon successful QT&E, subsequent QOT&E, and approved production design, a Program Management Responsibility Transfer (PMRT) will be executed to WR-ALC. A follow-on limited production buy of 50

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ship sets of APC-4 flight hardware, spares, and provisioning data will be acquired by WR-ALC.

(2) In a letter to HQ TAC/DRA, AD/YMA requested 325 FWW/TE perform an QOT&E of the APC-4 installed on a BQM-34A target.

2. DESCRIPTION.

a. Test Item Description.

(1) Plume Wingtip Pod: The pod is 66 inches long, 5.0 inches in diameter, and weighs 25 pounds maximum. The APC-4 pod, when installed on a BQM-34A, is used to provide infrared plume augmentation for the evaluation of weapon systems employing air-to-air infrared guided missiles. Each pod may be ignited up to four times per mission.

(2) The BQM-34A normally carries two pods, one mounted on each wing tip. Each pod is activated and deactivated by the target controller via drone tracking and control station (DTCS) commands.

(3) The wingtip pod installation kit contains all the parts, hardware, and instructions required to install two APC-4 IR plume pods on a BQM-34A.

(4) The pod, when installed on the standard BQM-34A wing tip, is designed to operate under all normal loads imposed by the BQM-34A during normal launch, flight, and recovery conditions.

(5) The APC-4 is designed to be aerodynamically compatible with the BQM-34A over its entire operational envelope. The pod is designed to be stable and to produce minimum drag under normal maneuvers.

(6) The pod shall be capable of ignition at all airspeeds from 200 knots indicated to the maximum airspeed of the target at all altitudes to 20,000 feet mean sea level (MSL). The pod, when operating, uses 0.6 gallon/minute of fuel from the target's fuel system.

(7) Scoring:

(a) The pod shall contain provisions for installation of a single line scoring antenna compatible with the AN/DSQ-24A DIGIGOPS scoring unit.

(b) The kit shall have provisions for mounting and controlling a coaxial switch that will transfer the scoring center from the left hand to the right hand pod on radio command from the target controller.

(8) Six prototype APC-4 pods are currently available at Tyndall AFB, FL to support functional check flights (Phase I) in an IOT&E and 20 additional pods will be made available for testing in WSEP (Phase II). These pods will be modified with thermocouple kits for a downlink GO NO-GO signal.

b. Test Description. A QOT&E of the APC-4 will be conducted at Tyndall AFB, FL by the 325 FWW and supported with spares, test equipment, and documentation/manuals sufficient to support four to six functional test flights in Phase I, and seven to eight WSEP missions using the J-69 configured BQM-34As and six to seven WSEP missions using the J-85 configured BQM-34A during Phase II. Prior to beginning the WSEP portion, approximately four to six functional missions will be accomplished to check out scoring system performance and possibly gather infrared measurement data from the forward and rear aspect using the Armament Division's BASES equipped F-4 aircraft. It is anticipated that 15 missions in support of WSEP will be accomplished.

3. OBJECTIVES.

a. Purpose. The purpose of this test is to perform a qualification operational test and evaluation of the operational effectiveness and operational suitability IAW AFM 55-43 of the APC-4 infrared plume generator installed first in J-69, and subsequently J-85, engine configured BQM-34A targets and flown in an actual WSEP environment. Fewer test missions will be flown with the J-85 configuration to avoid redundancy.

b. Operational Effectiveness (APC-4/J-69/J-85).

(1) Assess the capability to provide adequate IR augmentation to simulate threat aircraft IR signatures and to meet the IR augmentation requirements of the WSEP users.

(2) Assess the capability of the system to perform as designed and identify design deficiencies.

(3) Evaluate the compatibility of the APC-4 with the target and DTCS functions. Evaluate impacts on mission endurance, target performance, and maneuverability.

(4) Determine the operational envelope of the APC-4 to include effects due to airspeed, altitude, and angle of attack.

(5) Evaluate the capability of the scoring system to score missiles.

(6) Evaluate the survivability of the APC-4 pod.

c. Operational Suitability (APC-4/J-69/J-85).

(1) Evaluate the logistics supportability.

(a) Evaluate the adequacy of support equipment.

(b) Evaluate the adequacy of technical data, maintenance manuals, and operational/checkout procedures.

(c) Assess the adequacy of planned logistics support.

(d) Evaluate the adequacy of the planned training for the 325 FW O&M subscale contractor.

(2) Assess the reliability.

(a) Assess the reliability of the ignition system.

(b) Assess the mission reliability.

(c) Compare component reliability factors to those predicted by the contractor.

(3) Assess the maintainability.

(a) Determine the mean-time-to-repair for interchangeable components.

(b) Identify design improvements to aid equipment access or to improve system design.

(c) Identify any peculiar support equipment and calibration procedures required but not documented by the contractor.

(d) Evaluate the impact of salt water immersion and assess the adequacy of the waterproofing/sealing and decontamination procedures.

(e) Determine the maintenance man-hours required to maintain the APC-4 system.

4. CONCEPT OF EMPLOYMENT. The APC-4 infrared pods will be flown on BQM-34A subscale targets in support of air-to-air missile firing weapon systems evaluation and aircrew training missions conducted at Tyndall AFB, FL and Wallace AFS, PI.

5. QOT&E TEST PLAN. A QOT&E test plan will be prepared by 475 TESTS, coordinated with AD/YMA, and submitted by the USAFADWC commander to HQ TAC/DR for approval IAW AFM 55-43 and TACR 55-10.

6. RESPONSIBILITIES.

a. HQ TAC/DR will: Appoint a project officer, Maj Norm Schoening, DRAA/AV 432-5914, who will accomplish responsibilities IAW AFR 80-14 and TACR 55-10.

b. ADTAC/DR will:

(1) Appoint a project monitor, LtCol John Carpenter, DRT/AV 432-6214, who will coordinate on the test plan and final report.

(2) Support the test activity of the 325 FW.

c. USAFADWC will:

(1) Coordinate and submit the QOT&E test plan and final report to HQ TAC for approval.

(2) Support 325 FWW test activity.

d. 325 FWW/TE will:

(1) Appoint a project officer, 1Lt Louis Szabo, TEO/
AV 970-4661.

(2) Coordinate on the QOT&E test plan and final report.

(3) Provide BQM-34A test assets.

(4) Provide range safety and target management support as required.

(5) Manage 325 FWW subscale O&M contractor test support activity as required.

e. 475 TESTS will:

(1) Appoint a project manager, 1Lt Ralph McClain, TEOT/
AV 970-3201.

(2) Design and plan the QOT&E test plan IAW AFM 55-43 and incorporate comments from AD/YMA, 4484 FWS/TG, and WR-ALC.

(3) Collect, analyze, and report on test data, and ensure data are sufficient to satisfy the test objectives.

(4) Be the responsible test organization for the QOT&E.

(5) Conduct a test plan working group (TPWG) with all test participants to coordinate and document test requirements and responsibilities into the test plan.

(6) Conduct and chair a system safety review prior to the start of physical testing.

(7) Coordinate all scheduling and test resources.

(8) Prepare the final QOT&E report IAW AFM 55-43, and after HQ TAC approval, publish and distribute the report.

(9) Transmit beginning and completion of test messages.

f. AD/YMA has agreed to and will:

(1) Appoint project officers to monitor, coordinate, and lend technical expertise:

(a) Lt Ken Pickler, YMTT, project officer, AV 872-3254.

(b) Mr. Bill Semmes, YMEE, physicist, AV 872-3408/2046.

(2) Prepare a statement of work and monitor contractor progress prior to and during QOT&E testing.

(3) Exercise engineering responsibilities.

(4) Provide inputs on the QOT&E test plan and final report.

(5) Schedule F-4 BASES radiometric aircraft support as required.

(6) Submit a modification package to WR-ALC for the installation and test of the APC-4 pods on a BQM-34A.

(7) Be a member of the TPWG.

g. USAFTAWC will:

(1) Appoint a project officer, Maj Gillespie, 4484 FWS/TG, AV 872-8576, to monitor testing.

(2) Provide inputs to the test plan and final report.

(3) Be a member of the TPWG.

h. WR-ALC/MMY has agreed to and will:

(1) Monitor test progress and provide assistance as required.

(2) Attend the TPWG.

7. TARGET DATES (MILESTONES).

Class II mod approval	-	Jun 83
Test plan approval	-	Jun 83
Initiation of Phase I flight tests	-	Jul 83
Completion of Phase I flight tests	-	Sep 83
Initiation of Phase II test flights	-	Feb 84
Completion of Phase II test flights	-	May 84
Final report approved	-	Jul 84.

8. TEST REPORTS. Messages will be forwarded to HQ TAC/DRP and ADTAC/DR indicating actual start date of the test and the date that TAC resources are released from the project. A final report will be prepared IAW

AFM 55-43 and TACR 55-10. Service reports will be submitted to AD/YMA for action in compliance with TO-00-35D-54, Section V.

9. PRIORITY. TAC Priority is 4.

10. AUTHORITY. TACR 55-10.

11. RESOURCES. 325 FWW/TE BQM-34A resources will be used. Funding will be 12897F. Approximately six dedicated and fifteen WSEP support missions will be flown. AD/YMA will procure twenty-six APC-4 pods and the associated support equipment.

12. SAFETY. Mishap prevention is the responsibility of 475 TESTS. Mishaps will be investigated and reported IAW AFR 127-4, with assistance as required by 325 FWW/TE/SEF. Personnel and equipment safety will take precedence over completion of any part of this test. The project manager is responsible for the overall safety of this QOT&E. A detailed safety review, chaired by 475 TESTS, will be conducted prior to the start of active QOT&E ground and flight evaluations. All potential hazards will be resolved to the satisfaction of the test participants prior to the start of testing. A certification of this review will be included in the permanent project case files.

13. RELEASE OF INFORMATION. News releases must be coordinated through the test project manager and released by the USAFADWC Public Affairs Office. News releases will not state nor imply endorsement of items undergoing test.

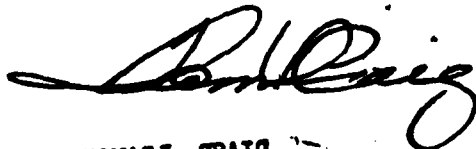
14. SECURITY. This QOT&E will generate classified IR measurement and scoring data. Classified information generated during the QOT&E will be handled in compliance with DOD 5200.1-R/AFR 205-1, as supplemented by TAC. Classified scoring data will be handled IAW local procedures for WSEP missions. Any infrared measurement data obtained by use of the Armament Division's BASES equipped F-4 will be handled by AD personnel IAW their local procedures.

15. ENVIRONMENTAL IMPACT. The conduct of this evaluation will not have adverse effects on the environment since no events are planned which differ from normal missions conducted by the 325 FWW. AFR 19-1, as supplemented, will be complied with.

16. STATEMENT OF INVESTIGATION. The objectives of this project do not duplicate previous or current projects accomplished and documented by this or other government agencies.

17. DISTRIBUTION. See attached list.

FOR THE COMMANDER



THOMAS L. CRAIG
Brigadier General, USAF
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